

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1.–26. (canceled).

27. (currently amended): ~~The radio communications device according to claim 26, A~~
radio communications device comprising:

a transmitter comprising:

_____ a plurality of transmission antennas for radiating radio waves based on
transmission RF signals;

_____ a plurality of transmitting circuit means for supplying the transmission RF signals
to said plurality of the transmission antennas, respectively, based on a plurality of transmission
signals; and

_____ transmission signal processing means comprising modulating means, for
modulating input transmission data to generate said plurality of the transmission signals by using
said modulating means, and for outputting the modulated plurality of the transmission signals to
said plurality of the transmitting circuit means;

a receiver comprising:

_____ a plurality of reception antennas for receiving the radio waves transmitted by the plurality of the transmission antennas and outputting reception RF signals based on the received radio waves;

_____ a plurality of receiving circuit means for outputting reception signals based on said reception RF signals output respectively by said plurality of the reception antennas; and

_____ reception signal processing means comprising demodulating means, for demodulating the reception signals output respectively from said plurality of the receiving circuit means by using said demodulating means to generate reception data;

_____ propagation detecting means for detecting a propagating state of said radio waves received by said plurality of the reception antennas;

_____ symbol rate setting means for selecting a symbol rate, to be used during modulation and demodulation, from a plurality of symbol rates based on the detected propagating state, and for setting the selected symbol rate in said modulating means and said demodulating means;

_____ control means for instructing said symbol rate setting means to set a high symbol rate or a low symbol rate in said modulating means and said demodulating means based on the propagating state detected by said propagation detecting means, wherein said control means determines an intensity of multipath interference based on the propagating state of said received radio waves detected by said propagation detecting means, instructs said symbol rate setting means to set [[a]] the high symbol rate in said modulating means and said demodulating means when it is determined that the intensity of the multipath interference is weak, and instructs said symbol rate setting means to set [[a]] the low symbol rate in said modulating means and said

demodulating means when it is determined that the intensity of the multipath interference is

strong; and

means for lowering a multilevel modulation index used to modulate and demodulate the transmission data and the reception signals in said modulating means and said demodulating means, respectively, when said high symbol rate is set, and increasing the multilevel modulation index in said modulating means and said demodulating means, respectively, when said low symbol rate is set,

wherein said symbol rate setting means and said means for lowering and increasing the multilevel modulation index simultaneously and dynamically change the symbol rate and the multilevel modulation index, respectively, according to the intensity of the multipath interference.

28. (canceled).

29. (currently amended): ~~The radio communications device according to claim 28A~~ radio communications device comprising:

a transmitter comprising:

— a plurality of transmission antennas for radiating radio waves based on transmission RF signals;

_____ a plurality of transmitting circuit means for supplying the transmission RF signals to said plurality of the transmission antennas, respectively, based on a plurality of transmission signals; and

_____ transmission signal processing means comprising a plurality of modulating means having respective different modulating schemes, for modulating input transmission data to generate said plurality of the transmission signals by using a selected one of said plurality of the modulating means, and for outputting the transmission signals to said plurality of the transmitting circuit means;

a receiver comprising:

_____ a plurality of reception antennas for receiving the radio waves transmitted by the plurality of the transmission antennas and outputting reception RF signals based on the received radio waves;

_____ a plurality of receiving circuit means for outputting reception signals based on said reception RF signals output respectively by said plurality of the reception antennas; and

_____ reception signal processing means comprising a plurality of demodulating means having respective different demodulation schemes, for demodulating the reception signals output respectively by said plurality of the receiving circuit means by using a selected one of said plurality of the demodulating means to generate reception data;

_____ propagation detecting means for detecting a propagating state of said received radio waves;

modulating means/demodulating means selecting means for selecting one of said modulating means and one of said demodulating means for modulating the input transmission data and for demodulating the reception signals, respectively, based on the detected propagating state;

control means for instructing said modulating means/demodulating means selecting means to select modulating means and demodulating means which have a high symbol rate or to select modulating means and demodulating means which have a low symbol rate based on the propagating state detected by said propagation detecting means, wherein said control means determines an intensity of multipath interference based on the propagating state of said received radio waves detected by said propagation detecting means, instructs said modulating means/demodulating means selecting means to select modulating means and demodulating means which have [[a]] the high symbol rate when it is determined that the intensity of the multipath interference is weak, and instructs said modulating means/demodulating means selecting means to select modulating means and demodulating means which have [[a]] the low symbol rate when it is determined that the intensity of the multipath interference is strong; and

means for lowering a multilevel modulation index used to modulate and demodulate the transmission data and the reception signals in said selected modulating means and said selected demodulating means, respectively, when said high symbol rate is selected, and increasing the multilevel modulation index in said selected modulating means and said selected demodulating means, respectively, when said low symbol rate is selected,

wherein said modulating means/demodulating means selecting means and said means for lowering and increasing the multilevel modulation index simultaneously and dynamically change the symbol rate and the multilevel modulation index, respectively, according to the intensity of the multipath interference.

30-31. (canceled).

32. (currently amended): The radio communications device according to ~~claim 26 or 27~~ claim 27, wherein said transmission signal processing means and said reception signal processing means reduce a number of said plurality of the transmitting circuit means to be used and the number of said plurality of the receiving circuit means to be used when said high symbol rate is set, and increase the number of said plurality of the transmitting circuit means to be used and the number of said plurality of the receiving circuit means to be used when said low symbol rate is set.

33. (currently amended): The radio communications device according to ~~claim 28 or 29~~ claim 29, wherein said transmission signal processing means and said reception signal processing means reduce a number of said plurality of the transmitting circuit means to be used and the number of said plurality of the receiving circuit means to be used when said high symbol rate is selected, and increase the number of said plurality of the transmitting circuit means to be

used and the number of said plurality of the receiving circuit means to be used when said low symbol rate is selected.

34. (previously presented): The radio communications device according to claim 27 or 29, wherein said control means instructs said transmission signal processing means and said reception signal processing means to use one of said plurality of transmitting circuit means and one of said plurality of receiving circuit means, respectively, when it is determined that the intensity of the multipath interference is weak, and instructs said transmission signal processing means and said reception signal processing means to use said plurality of transmitting circuit means and said plurality of receiving circuit means, respectively, when it is determined that the intensity of the multipath interference is strong.

35. (currently amended): A radio communications device comprising:
a transmitter comprising:
a plurality of transmission antennas for radiating radio waves based on
transmission RF signals;
a plurality of transmitting circuit means for supplying the transmission RF signals
to said plurality of the transmission antennas, respectively, based on a plurality of transmission
signals; and
transmission signal processing means comprising modulating means, for
modulating input transmission data to generate said plurality of the transmission signals by using

said modulating means, and for outputting the modulated plurality of the transmission signals to said plurality of the transmitting circuit means;

a receiver comprising:

a plurality of reception antennas for receiving the radio waves transmitted by the plurality of the transmission antennas and outputting reception RF signals based on the received radio waves;

a plurality of receiving circuit means for outputting reception signals based on said reception RF signals output respectively by said plurality of the reception antennas; and

reception signal processing means comprising demodulating means, for demodulating the reception signals output respectively from said plurality of the receiving circuit means by using said demodulating means to generate reception data;

propagation detecting means for detecting a propagating state of said radio waves received by said plurality of the reception antennas; and

symbol rate setting means for selecting a symbol rate, to be used during modulation and demodulation, from a plurality of symbol rates based on the detected propagating state, and for setting the selected symbol rate in said modulating means and said demodulating means,

wherein said modulating means has modulation modes including a direct modulation mode for directly modulating said input transmission data into a transmission carrier and an indirect modulation mode for modulating said input transmission data into a transmission carrier after the input transmission data are processed, said demodulating means has demodulation modes including a direct demodulation mode for directly demodulating said reception signals to

generate said reception data and an indirect demodulation mode for demodulating the reception signals and thereafter processing the demodulated reception signals to generate said reception data[.]; ~~said radio communications device further comprising~~

modulation/demodulation mode selecting means for selecting and setting said modulation modes and said demodulation modes, wherein said modulation/demodulation mode selecting means determines an intensity of multipath interference based on the propagating state of said received radio waves detected by said propagation detecting means, instructs said modulating means and said demodulating means to use said direct modulation mode and said direct demodulation mode, respectively, when it is determined that the intensity of the multipath interference is weak, and instructs said modulating means and said demodulating means to use said indirect modulation mode and said indirect demodulation mode, respectively, when it is determined that the intensity of the multipath interference is strong; and

means for lowering a multilevel modulation index used to modulate and demodulate the transmission data and the reception signals in said modulating means and said demodulating means, respectively, when said high symbol rate is set, and increasing the multilevel modulation index in said modulating means and said demodulating means, respectively, when said low symbol rate is set.

wherein said symbol rate setting means and said means for lowering and increasing the multilevel modulation index simultaneously and dynamically change the symbol rate and the multilevel modulation index, respectively, according to the intensity of the multipath interference.

36. (canceled).

37. (previously presented): The radio communications device according to claim 34, wherein said control means instructs said modulating means and said demodulating means to select any one of modulating and demodulating processes including ASK, BPSK, FSK, QPSK, and DQPSK for modulating and demodulating the transmission data and the reception signals, respectively, and to use one of said plurality of transmitting circuit means and one of said plurality of receiving circuit means, respectively, when it is determined that the intensity of the multipath interference is weak, and instructs said modulating means and said demodulating means to select either of modulating and demodulating processes including OFDM with multilevel PSK or multilevel QAM as a primary modulation for modulating and demodulating the transmission data and the reception signals, respectively, and to use said plurality of transmitting circuit means and said plurality of receiving circuit means, respectively, when it is determined that the intensity of the multipath interference is strong.

38. (previously presented): The radio communications device according to claim 32, further comprising:

power supply control means for controlling power supplies of said plurality of transmitting circuit means and said plurality of receiving circuit means, respectively, to stop

supplying electric power to the transmitting circuit means and the receiving circuit means which are not in use.

39-40. (canceled).

41. (currently amended): A radio transmitter comprising:
a plurality of transmission antennas for radiating radio waves based on RF signals;
a plurality of transmitting circuit means for supplying the RF signals to said plurality of the transmission antennas, respectively, based on a plurality of transmission signals;
transmission signal processing means comprising modulating means, for modulating input transmission data to generate said plurality of the transmission signals by using said modulating means, and for outputting the plurality of the transmission signals to said plurality of the transmitting circuit means;

symbol rate setting means for selecting a symbol rate, to be used by the modulating means to modulate the input transmission data, from a plurality of symbol rates based on a detected propagating state of said radio waves, and for setting the selected symbol rate in said modulating means; and

control means for instructing said symbol rate setting means to set a high symbol rate or a low symbol rate in said modulating means based on the detected propagating state, wherein said control means determines an intensity of multipath interference based on the propagating state of said radio waves, instructs said symbol rate setting means to set the high symbol rate in said

modulating means when it is determined that the intensity of the multipath interference is weak,
and instructs said symbol rate setting means to set the low symbol rate in said modulating means
when it is determined that the intensity of the multipath interference is strong; and

means for lowering a multilevel modulation index used to modulate the transmission data
in said modulating means when said high symbol rate is set, and increasing the multilevel
modulation index in said modulating means when said low symbol rate is set,

wherein said symbol rate setting means and said means for lowering and increasing the
multilevel modulation index simultaneously and dynamically change the symbol rate and the
multilevel modulation index, respectively, according to the intensity of the multipath
interference.

42. (currently amended): A radio receiver comprising:

a plurality of reception antennas for receiving radio waves from a transmitter and
outputting reception RF signals;

a plurality of receiving circuit means for outputting reception signals based on said
reception RF signals output respectively by said plurality of the reception antennas;

reception signal processing means comprising demodulating means, for demodulating the
reception signals output respectively by said plurality of the receiving circuit means by using
said demodulating means to generate reception data;

symbol rate setting means for selecting a symbol rate, to be used by said demodulator
demodulating means to demodulate the reception signals, from a plurality of symbol rates based

on a detected propagating state of said radio waves, and for setting the selected symbol rate in said demodulating means; and

control means for instructing said symbol rate setting means to set a high symbol rate or a low symbol rate in said demodulating means based on the detected propagating state, wherein said control means determines an intensity of multipath interference based on the propagating state of said radio waves, instructs said symbol rate setting means to set the high symbol rate in said demodulating means when it is determined that the intensity of the multipath interference is weak, and instructs said symbol rate setting means to set the low symbol rate in said demodulating means when it is determined that the intensity of the multipath interference is strong; and

means for lowering a multilevel modulation index used to demodulate the reception signals in said demodulating means when said high symbol rate is set, and increasing the multilevel modulation index in said demodulating means when said low symbol rate is set,

wherein said symbol rate setting means and said means for lowering and increasing the multilevel modulation index simultaneously and dynamically change the symbol rate and the multilevel modulation index, respectively, according to the intensity of the multipath interference.

43. (currently amended): A radio transmitter comprising:
a plurality of transmission antennas for radiating radio waves based on RF signals;

a plurality of transmitting circuit means for supplying the RF signals to said plurality of the transmission antennas, respectively, based on a plurality of transmission signals;

transmission signal processing means comprising a plurality of modulating means having respective different modulating schemes, for modulating input transmission data to generate said plurality of the transmission signals by using a selected one of said plurality of the modulating means, and for outputting the transmission signals to said plurality of the transmitting circuit means;

modulating means selecting means for selecting one of said modulating means to be used for modulating the input transmission data based on a detected propagating state of said radio waves; and

control means for instructing said modulating means selecting means to select modulating means which have a high symbol rate or to select modulating means which have a low symbol rate based on the detected propagating state, wherein said control means determines an intensity of multipath interference based on the propagating state of said radio waves, instructs said modulating means selecting means to select modulating means which have the high symbol rate when it is determined that the intensity of the multipath interference is weak, and instructs said modulating means selecting means to select modulating means which have the low symbol rate when it is determined that the intensity of the multipath interference is strong; and

means for lowering a multilevel modulation index used to modulate the transmission data in said selected modulating means when said high symbol rate is selected, and increasing the

multilevel modulation index in said selected modulating means when said low symbol rate is selected,

wherein said modulating means selecting means and said means for lowering and increasing the multilevel modulation index simultaneously and dynamically change the symbol rate and the multilevel modulation index, respectively, according to the intensity of the multipath interference.

44. (currently amended): A radio receiver comprising:

a plurality of reception antennas for receiving radio waves from a transmitter and outputting reception RF signals;

a plurality of receiving circuit means for outputting reception signals based on said reception RF signals output respectively by said plurality of the reception antennas;

reception signal processing means comprising a plurality of demodulating means having respective different demodulating schemes, for demodulating the reception signals output respectively by said plurality of the receiving circuit means by using a selected one of said plurality of the demodulating means to generate reception data;

demodulating means selecting means for selecting one of said demodulating means to be used for demodulating the reception signals based on a detected propagating state of said radio waves; and

control means for instructing said demodulating means selecting means to select demodulating means which have a high symbol rate or to select demodulating means which have

a low symbol rate based on the detected propagating state, wherein said control means determines an intensity of multipath interference based on the propagating state of said radio waves, instructs said demodulating means selecting means to select demodulating means which have the high symbol rate when it is determined that the intensity of the multipath interference is weak, and instructs said demodulating means selecting means to select demodulating means which have the low symbol rate when it is determined that the intensity of the multipath interference is strong; and

means for lowering a multilevel modulation index used to demodulate the reception signals in said selected demodulating means when said high symbol rate is selected, and increasing the multilevel modulation index in said selected demodulating means when said low symbol rate is selected,

wherein said demodulating means selecting means and said means for lowering and increasing the multilevel modulation index simultaneously and dynamically change the symbol rate and the multilevel modulation index, respectively, according to the intensity of the multipath interference.

45-48. (canceled).

49. (currently amended): A radio communications device comprising:
a transmitter comprising:

a plurality of transmission antennas for radiating radio waves based on transmission RF signals;

a plurality of transmitting circuits for supplying the transmission RF signals to said plurality of the transmission antennas, respectively, based on a plurality of transmission signals; and

a transmission signal processing circuit comprising a modulator, for modulating input transmission data to generate said plurality of the transmission signals by using said modulator, and for outputting the modulated plurality of the transmission signals to said plurality of the transmitting circuits;

a receiver comprising:

a plurality of reception antennas for receiving the radio waves transmitted by the plurality of the transmission antennas and outputting reception RF signals based on the received radio waves;

a plurality of receiving circuits for outputting reception signals based on said reception RF signals output respectively by said plurality of the reception antennas; and

a reception signal processing circuit comprising a demodulator, for demodulating the reception signals output respectively from said plurality of the receiving circuits by using said demodulator to generate reception data;

a propagation detecting circuit for detecting a propagating state of said radio waves received by said plurality of the reception antennas;

a symbol rate setting circuit for selecting a symbol rate, to be used during modulation and demodulation, from a plurality of symbol rates based on the detected propagating state, and for setting the selected symbol rate in said modulator and said demodulator; and

a control circuit for instructing said symbol rate setting circuit to set a high symbol rate or a low symbol rate in said modulator and demodulator based on the propagating state detected by said propagation detecting circuit, wherein said control circuit determines an intensity of multipath interference based on the propagating state of said received radio waves detected by said propagation detecting circuit, instructs said symbol rate setting circuit to set the high symbol rate in said modulator and said demodulator when it is determined that the intensity of the multipath interference is weak, and instructs said symbol rate setting circuit to set the low symbol rate in said in said modulator and said demodulator when it is determined that the intensity of the multipath interference is strong; and

a multilevel modulation index adjustment circuit which lowers a multilevel modulation index used to modulate and demodulate the transmission data and the reception signals in said modulator and demodulator, respectively, when said high symbol rate is set, and which increases the multilevel modulation index in said modulator and demodulator, respectively, when said low symbol rate is set,

wherein said symbol rate setting circuit and said multilevel modulation index adjustment circuit simultaneously and dynamically change the symbol rate and the multilevel modulation index, respectively, according to the intensity of the multipath interference.

50. (currently amended): A radio receiver comprising:

a plurality of reception antennas for receiving radio waves from a transmitter and
outputting reception RF signals;

a plurality of receiving circuits for outputting reception signals based on said reception
RF signals output respectively by said plurality of the reception antennas;

a reception signal processing circuit comprising a demodulator, for demodulating the
reception signals output respectively by said plurality of the receiving circuits by using said
demodulator to generate reception data;

a symbol rate setting circuit for selecting a symbol rate, to be used by said demodulator to
demodulate the reception signals, from a plurality of symbol rates based on a detected
propagating state of said radio waves, and for setting the selected symbol rate in said
demodulator; and

a control means circuit for instructing said symbol rate setting circuit to set a high symbol
rate or a low symbol rate in said demodulator based on the detected propagating state, wherein
said control circuit determines an intensity of multipath interference based on the propagating
state of said radio waves, instructs said symbol rate setting circuit to set the high symbol rate in
said demodulator when it is determined that the intensity of the multipath interference is weak,
and instructs said symbol rate setting means to set the low symbol rate in said demodulator when
it is determined that the intensity of the multipath interference is strong; and

a multilevel modulation index adjustment circuit which lowers the multilevel modulation
index used to demodulate the reception signals in said demodulator when said high symbol rate

is set, and which increases the multilevel modulation index in said demodulator when said low symbol rate is set.

wherein said symbol rate setting circuit and said multilevel modulation index adjustment circuit simultaneously and dynamically change the symbol rate and the multilevel modulation index, respectively, according to the intensity of the multipath interference.

51. (currently amended): A radio communication device comprising:

a plurality of modulating means for modulating transmission data to generate a plurality of transmission signals;

a plurality of transmission means for supplying, based on said plurality of transmission signals, transmission RF signals to a plurality of transmission antennas, wherein said plurality of transmission antennas radiate radio waves based on the transmission RF signals;

a plurality of demodulating means for demodulating reception signals based on reception RF signals output from reception antennas that have received the radio waves from the plurality of the transmission antennas, to generate reception data, wherein the reception antennas output the reception RF signals based on the received radio waves;

propagation detecting means for detecting a propagating state of said received radio waves; and

control means for selecting, based on the propagating state detected by said propagation detecting means, modulating means, among the plurality of the modulating means, and demodulating means, among the plurality of the demodulating means, which have a high symbol

rate or for selecting, based on the propagating state detected by said propagation detecting means, modulating means, among the plurality of the modulating means, and demodulating means, among the plurality of the demodulating means, which have a low symbol rate,

wherein a first symbol rate in said plurality of modulating means and a second symbol rate in said plurality of demodulating means are set based on an intensity of the multipath interference which is determined based on the detected propagating state of the radio waves,

wherein said control means determines the intensity of the multipath interference based on the propagating state of said received radio waves detected by said propagation detecting means, said control means selects modulating means and demodulating means which have the high symbol rate when it is determined that the intensity of the multipath interference is weak, and said control means selects modulating means and demodulating means which have the low symbol rate when it is determined that the intensity of the multipath interference is strong; and

means for lowering a multilevel modulation index used to modulate and demodulate the transmission data and the reception signals in said selected modulating means and said selected demodulating means, respectively, when said high symbol rate is selected, and increasing the multilevel modulation index in said selected modulating means and said selected demodulating means, respectively, when said low symbol rate is selected,

wherein said control means and said means for lowering and increasing the multilevel modulation index simultaneously and dynamically change the symbol rate and the multilevel modulation index, respectively, according to the intensity of the multipath interference.

52. (currently amended): A radio communications device comprising:

a transmitter comprising:

a plurality of transmission antennas for radiating radio waves based on
transmission RF signals;

a plurality of transmitting circuit means for supplying the transmission RF signals
to said plurality of the transmission antennas, respectively, based on a plurality of transmission
signals; and

transmission signal processing means comprising a plurality of modulating means
having respective different modulating schemes, for modulating input transmission data to
generate said plurality of the transmission signals by using a selected one of said plurality of the
modulating means, and for outputting the transmission signals to said plurality of the
transmitting circuit means;

a receiver comprising:

a plurality of reception antennas for receiving the radio waves transmitted by the
plurality of the transmission antennas and outputting reception RF signals based on the received
radio waves;

a plurality of receiving circuit means for outputting reception signals based on
said reception RF signals output respectively by said plurality of the reception antennas; and

reception signal processing means comprising a plurality of demodulating means
having respective different demodulation schemes, for demodulating the reception signals output

respectively by said plurality of the receiving circuit means by using a selected one of said plurality of the demodulating means to generate reception data;

propagation detecting means for detecting a propagating state of said received radio waves; and

modulating means/demodulating means selecting means for selecting, based on the detected propagating state, one of said modulating means and one of said demodulating means for modulating the input transmission data and for demodulating the reception signals, respectively, which selected modulating means and selected demodulating means have a high symbol rate or have a low symbol rate ~~based on the detected propagating state~~, wherein said selected modulating means has modulation modes including a direct modulation mode for directly modulating said input transmission data into a transmission carrier and an indirect modulation mode for modulating said input transmission data into a transmission carrier after the input transmission data are processed, said selected demodulating means has demodulation modes including a direct demodulation mode for directly demodulating said reception signals to generate said reception data and an indirect demodulation mode for demodulating the reception signals and thereafter processing the demodulated reception signals to generate said reception data ~~[[.]]; said radio communications device further comprising~~

modulation/demodulation mode selecting means for selecting and setting said modulation modes and said demodulation modes, wherein said modulation/demodulation mode selecting means determines an intensity of multipath interference based on the propagating state of said received radio waves detected by said propagation detecting means, instructs said selected

modulating means and said selected demodulating means to use said direct modulation mode and said direct demodulation mode, respectively, when it is determined that the intensity of the multipath interference is weak, and instructs said selected modulating means and said selected demodulating means to use said indirect modulation mode and said indirect demodulation mode, respectively, when it is determined that the intensity of the multipath interference is strong; and means for lowering a multilevel modulation index used to modulate and demodulate the transmission data and the reception signals in said selected modulating means and said selected demodulating means, respectively, when said high symbol rate is set in said selected modulating means and said selected demodulating means, and increasing the multilevel modulation index in said selected modulating means and said selected demodulating means, respectively, when said low symbol rate is set in said selected modulating means and said selected demodulating means, wherein said modulating means/demodulating means selecting means and said means for lowering and increasing the multilevel modulation index simultaneously and dynamically change the symbol rate and the multilevel modulation index, respectively, according to the intensity of the multipath interference.

53. (canceled).